Department of Energy

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JAN 0 5 2004

DOE-0095-04

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V, SR-6J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF THE RESPONSE TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE 2003 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN AND AN UPDATED EVALUATION TO ESTIMATE THE POUNDS OF URANIUM DISCHARGED FROM FCP UNCONTROLLED SURFACE WATER RUNOFF

This letter transmits the subject documents to the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA). It should be noted that the USEPA and OEPA comments regarding the 2003 Annual Review of the integrated Environmental Monitoring Plan (IEMP), Revision 3 do not impact proposed activities other than Indiana brown bat surveys and BTV evaluations. Therefore, a request was made during the weekly conference call of December 30, 2003 to implement proposed changes, except for the issues commented upon (i.e., Indiana brown bat surveys and BTV evaluations) that are addressed through the enclosed comment response document.

Additionally included in this transmittal (Enclosure A) is an updated evaluation to estimate the pounds of uranium discharged to the environment in uncontrolled runoff from the Fernald Closure Project (FCP). Recognizing that significant changes have occurred at the FCP landscape over the past four years as a result of active remediation, it is appropriate to re-evaluate this loading term in light of current conditions. This information was not included in the 2003 Annual Review of the IEMP because it is not formally presented in the IEMP, although yearly estimates are provided in annual site environmental reports. As the site is nearing closure, the intention is to annually perform this evaluation.

JAN 05 2004

Mr. James A. Saric
Mr. Tom Schneider

DOE-0095-04

If you have any questions concerning the enclosed documents, please contact Ed Skintik at (513) 648-3151.

Sincerely,

WJTaylor

William J. Taylor
Director

FCP:Skintik

Enclosures: As Stated

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RESPONSES TO U.S. EPA AND OEPA COMMENTS ON THE PROPOSED CHANGES RESULTING FROM THE 2003 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN, REVISION 3

FERNALD CLOSURE PROJECT
FERNALD, OHIO

DECEMBER 2003

U.S. DEPARTMENT OF ENERGY

RESPONSES TO USEPA COMMENTS ON THE PROPOSED CHANGES RESULTING FROM THE 2003 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN, REVISION 3

SPECIFIC COMMENTS

1. Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.4.1.2 Pg.#: D-8 Line #: NA Code: C
Specific Comment #: 1
Comment: The proposed change suggests that additional bat surveys be eliminated because no further ecological restoration in suitable bat habitat is planned and because bat surveys are not included in the scope of monitoring for restored areas or in the draft natural resource restoration plan. Ecological restoration is planned for the Paddy's Run Corridor, which contains suitable bat habitat. Therefore, bat surveys should not be eliminated.
Response: Restoration areas that encompass suitable habitat for the Indiana bat include Area 1, Phase III and Area 8, Phase II. Certification and ecological restoration activities are complete in both of these areas. No further disturbance or restoration of the Paddys Run channel is planned north of the railroad trestle. Therefore, additional bat surveys will not be required because activities will not be conducted in suitable bat habitat areas.
Action: No action required.

2. Commenting Organization: U.S EPA Commentor: Saric
Section #: Attachment D Pg.#: NA Line #: NA Code: C
Specific Comment #: 2
Comment: Attachment D proposes to discontinue surface water sampling driven solely by benchmark toxicity values (BTV) and to discontinue evaluations with respect to BTVs. Barium, cadmium, and silver in the surface water should continue to be monitored and the associated BTV evaluations should continue to be conducted in order to ensure that the Surface Water Monitoring Program is protective of ecological receptors.
Response: The sampling of cadmium, barium, and silver will continue as the current NPDES Permit requires it. Therefore, there will be continued assurance these parameters are being evaluated. However, there is no evidence based on historical data that these parameters are being discharged in concentrations that will threaten ecological receptors. The BTV exceedances reported in the past have only been for cadmium, and are considered artificial because the mixing equation being used for the in-stream estimate uses a background concentration above the cadmium BTV.

Sufficient evaluations with respect to BTVs have been conducted. The parameters will continue to be monitored and evaluated against NPDES requirements and FRLs; however, BTV evaluations will no longer be performed.
Action: No action required.

RESPONSES TO OEPA COMMENTS ON THE PROPOSED CHANGES RESULTING FROM THE 2003 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN

GENERAL COMMENTS

3. Commenting Organization: Ohio EPA   Commentor: DSW
Section #: D.4.1.2   Pg.#: D-8   Line #: NA   Code: C
Original Comment #: 1
Comment: The "proposed change" suggesting text be removed in regards to bat surveys is untrue and must be left as it is stated in the IEMP. There will be ecological restoration within the Paddys Run Corridor and the NRRP.
Response: See Comment Response #1.
Action: No action required.

4. Commenting Organization: Ohio EPA   Commentor: DSW
Section #: Global and Attachment D   Pg.#: NA   Line #: NA   Code: C
Original Comment #: 2
Comment: It is noted on page 1 of the summary of proposed changes that "it has been determined that the intent of the order (DOE Order 450.1) is met through existing DOE contractual requirements..." and attachment D describes the proposal to eliminate Benchmark Toxicity Values as drivers to surface water monitoring. It is unclear how DOE is, in general, considering the requirements of DOE Order 4b1 in these actions. Specifically, how does the IEMP implement a watershed approach for surface water protection (4b1b), and how does DOE consider proposed attachment D to be consistent with 4b1d, protection of other natural resources, including biota. Ohio EPA considers removal of BTVs as a driver to be contrary to this requirement.
Response: See Comment Response #2. With respect to IEMP monitoring, BTV evaluations have been performed for surface water and sediment, as these are the only two media (in the IEMP) that have associated BTVs per the Operable Unit 5 Record of Decision. The decision to eliminate BTV evaluations in the future does not substantively change the way DOE evaluates impacts—including natural resource impacts—to receiving waters. The comment refers to DOE order 450.1 in which consideration is to be given to a watershed approach for surface water protection. The FCP not only monitors specific FCP effluents to receiving waters, but also conducts in-stream sampling at background locations in Paddys Run and the Great Miami River, as well as in-stream sampling locations downstream of FCP activities. Moreover, surface water FRLs are established in-stream and not at FCP effluent discharge points. The extensive dataset generated from these efforts demonstrates that site conditions and remedial activities are protective of natural resources.

This ambient monitoring and assessment program is one part of a watershed-based protection program. A true watershed-based surface water protection program (evaluating and controlling discharges from a holistic standpoint involving multiple dischargers within a watershed) is not possible, or necessary, given the site-specific agreements governing FCP operations and commitments. Additionally, the sampling regimen specified in the IEMP coupled with in-stream surface water FRLs stipulated in the Operable Unit 5 Record of Decision ensure impacts to receiving waters are properly evaluated and remediation accomplishes Ohio water quality goals.

As for natural resources including biota with respect to Attachment D, there are no BTVs defined in the Operable Unit 5 Record of Decision for these resources/media and, as stated above, Attachment D is associated with surface water and sediment; therefore, natural resources including biota have not been evaluated against BTVs in the past nor will they be in the future. There is no change associated with their evaluation process and DOE intends to continue using the Biota Dose Assessment Committee's, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota."

Action: No action required.

ENCLOSURE A

EVALUATION OF URANIUM LOADING VIA UNCONTROLLED SURFACE WATER RUNOFF

ENCLOSURE A

EVALUATION OF URANIUM LOADING VIA UNCONTROLLED SURFACE WATER RUNOFF

A review was performed to reevaluate the loading term value used in estimating the pounds of uranium discharged to the environment in uncontrolled runoff from the Fernald Closure Project (FCP). The loading term value is specifically used in calculations for the annual site environmental reports to estimate the pounds of uranium discharged to the environment in uncontrolled runoff from the FCP. Since 2000, this estimate has been calculated using a loading term of 2.6 pounds of total uranium discharged to Paddys Run for every inch of rainfall. The loading term was last updated as part of the 1999 annual review of IEMP, Rev. 1.

The following subsections present the results of the evaluation process based on current drainage basin patterns and recent analytical data collected at the primary discharge points for uncontrolled runoff into Paddys Run. Included is the total uranium data set used in the evaluation, the location of the pertinent drainage basins and associated changes impacting uncontrolled runoff, and the statistical analysis and calculations used to develop the updated loading term. This information is organized under the following sections:

- Data preparation and statistical analysis (Section A.1)
- Equations and calculations (Section A.2)
- Conclusions (Section A.3).

The evaluation presented serves as the technical justification for revising/updating the loading term used for estimating the pounds of uranium discharged to the environment through uncontrolled runoff. The protocol associated with this evaluation is very similar to the protocol used in the 1999 annual review of IEMP, Rev. 1. As identified in the previous evaluation, it is anticipated that this evaluation process will be repeated in the future as remediation progresses and site conditions affecting the quantity and/or quality of uncontrolled runoff are documented.

A.1 DATA PREPARATION AND STATISTICAL ANALYSIS

In order to provide an assessment of impacts to surface water due to uncontrolled runoff, it was necessary to identify the uncontrolled drainage basin areas associated with the FCP. The FCP has divided the drainage areas outside the former production area and the waste pit area into 8 distinct drainage areas. Four of these areas are regulated under the current NPDES permit as storm water associated with an industrial activity. Each of these four drainage basins has an associated monitoring location (STRM 4003, STRM 4004/4004A, STRM 4005, and STRM 4006). These basins are monitored for total uranium under the IEMP program. Additionally there are four minor basins along the Paddys Run corridor bounded on the west by Paddys Run and on the east by physical features (e.g., waste pit trench system) or other drainage divides based on topography. Figure A-1 identifies the drainage basin areas associated with the FCP and the monitoring locations associated with the uncontrolled drainage basins.

The following subsections define the data set and assumptions used in order to reevaluate the value of interest and the statistical analysis the data underwent prior to performing the calculations. The four primary basins have associated data (STRM 4003, STRM 4004/4004A, STRM 4005, and STRM 4006). The four minor basins along the Paddys Run Corridor are not monitored; however, assumptions were made to estimate associated uranium concentrations and mass loadings (Section A.1.3).

A.1.1 Data Preparation

Post-remedial investigation total uranium concentrations from surface water locations STRM 4003, STRM 4004/4004A, STRM 4005, and STRM 4006 (additionally SWD-02 - discussed in Section A.1.3) were reviewed. Table A-1 presents the total uranium results for these locations from January 2001 to July 2003. From the table, it should be noted that the number of samples taken from the locations varies, because programmatic requirements (e.g., sample frequencies) and because of sample locations being dry at times. The data in the table were then screened using the standard IEMP data criteria:

1) Half the non-detectable concentrations were used (results with validation qualifier of U or UJ).

2) A concentration of zero was used if the validated result was less than zero (e.g., radiological constituents can have negative concentrations when laboratory backgrounds are subtracted from results).

3) The maximum result of either the field duplicate or normal sample was used if more than one sample existed for a given location on the same day.

4) Rejected data were not used (results with validation qualifier of Z or R).

The application of Criteria 1, 2, and 4 did not result in alteration of the data set. However, the data set was slightly altered when Criterion 3 was applied.

A.1.2 Statistical Analysis

The total uranium concentrations for each of the four surface water sample locations were established by determining the median concentrations of data collected at each respective sample location (refer to Table A-2). In the previous update of the loading term (1999 IEMP, Rev. 1 Annual Review), the 95 percent UCL was used to calculate the loading term because it was considered to be standard practice and provided conservative results; however, median results are thought to more likely represent the changing concentrations during the course of surface water discharge events (i.e., first flush would yield higher concentrations however concentrations will drop during the overall discharge event). Therefore, median concentrations will be used to determine the new loading term value. Note that for median determinations, all data were used in order to be conservative (i.e., no outliers were removed which is consistent with the previous revision of the loading term).

A.1.3 Assumptions to Estimate the Uranium Concentration and Mass Load from the Drainage Areas along the Paddys Run Corridor

In an effort to better refine the loading term, information regarding minor drainage areas was used in addition to data collected from STRM 4003, STRM 4004/4004A, STRM 4005, and STRM 4006:

- Waste Pit Corridor (WPC): This is the area west of the waste pit area bounded on the west by Paddys Run and the east by the waste pit area perimeter trench. The area has been scaled from topographic maps at 17 acres. A runoff coefficient is assumed to be 0.5 given the vegetation and lack of impervious areas. The concentration is assumed to be 25 μg/L based on both suspected soil contamination prior to Waste Pit Area Runoff Control Project (Removal Action 1) and similar runoff concentrations in the production area.

- Haul Road Corridor (HRC): This is the area bounded by the 4004/4004A and 4005 basins on the east and Paddys Run on the west. The area has been estimated at 18 acres. A runoff coefficient is assumed to be 0.5 given the vegetation and lack of impervious areas.

- Former Southern Waste Units Area (SWU). This is the entire area considered the Southern Waste Unit remediation area. The area has been estimated at 25 acres. A runoff coefficient is assumed to be 0.4 due to the vegetation in the area, the insignificant impervious area within the basin, and the several ponds in the area capturing a portion of the runoff.

- Bridge Area (BRIDGE): This area is bounded on the east by the 4003 drainage basin, on the west by Paddys Run and on the South by Willey Road. The area has been estimated at 5 acres. A runoff coefficient is assumed to be 0.5 given the vegetation and lack of impervious areas.

SWD-02 was selected as a representative monitoring point for the HRC, SWU, and BRIDGE areas. These locations are assumed to be slightly contaminated by past operations. Median total uranium concentration for SWD-02 is provided in Table A-2.

A.2 EQUATIONS AND CALCULATIONS

A.2.1 Equations

Equation 1 was used to determine the pounds of uranium per inch of rainfall estimated to be present in uncontrolled runoff from the FCP. This equation was used in the past to determine the previous value of 2.6 pounds of uranium per inch of rainfall (with the exception of using the median rather than 95 percent UCL total uranium concentration). The equation was used for each drainage basin area (identified on Figure A-1) and then the pounds of uranium per inch of rainfall (associated with each drainage basin) were summed in order to achieve a current representative number for the FCP. Calculations to determine pounds of uranium per inch of rainfall were determined based on median total uranium concentrations (refer to Table A-3).

Equation 1: $P = V * UC * 0.008337$

where:

P =	Pounds of uranium for each inch of rainfall (per drainage basin) (lbs/inch of rainfall)
V =	Volume of runoff per inch of rainfall (per drainage basin) (Mgal/inch of rainfall)
UC =	Median total uranium concentrations for basins STRM 4003, STRM 4004/4004A, STRM 4005, and STRM 4006 (μg/L). Total uranium concentration from the four minor basins are estimated as identified in Section A.1.3 (μg/L)
0.008337 =	Conversion factor used to convert to pounds per inch of rainfall ((L*lbs)/(Mgal*μg))

The total uranium concentrations (UC) used in the equations are provided in Table A-2.

The volume of runoff per inch of rainfall (V) in the above equation must be calculated for each drainage basin and is done so by the following equation:

Equation 2: $V = C * T * 0.027$

where:

V =	Volume of runoff per inch of rainfall (per drainage basin) (Mgal/inch of rainfall)
C =	Runoff coefficient (unitless)
T =	Total drainage basin area (acres)
0.027 =	Conversion factor used to convert to Mgal per inch of rainfall (Mgal/(acre*inch)

The runoff coefficients identified have been calculated for the primary drainage basins and were derived by the below equation. The runoff coefficients for the four minor basins have been estimated. Calculations and estimates are based on the EPA Office of Water Enforcement and Permits Guidance Manual/EPA Stormwater Guidance Manual (EPA 1991).

Equation 3: $C = (0.5 * TP/T) + (0.9 * TI/T)$

where:

C =	Runoff coefficient (unitless)
TP =	Total pervious drainage basin area (acres)
T =	Total drainage basin area (acres)
TI =	Total impervious drainage basin area (acres)

The acres associated with the drainage basins (total, pervious, and impervious) are presented in Table A-2. Total drainage basin area acreage does not include any acreage where surface water is controlled (refer to Figure A-1). Pervious drainage basin area refers to those areas with natural surfaces (e.g., grass and soils) and impervious drainage basin area refers to those areas with manmade surfaces (e.g., paved roads, gravel roads, and structures with roofs).

A.2.2 Calculations

The equations provided in Section A.2.1 along with Table A-2 were used to perform the calculations. Below are some sample equations and Table A-3 provides the results from all the equations.

Equation 3: C = (0.5 * TP/T) + (0.9 * TI/T)

for STRM 4003:

C = (0.5 * (482.9/515)) + (0.9 * (32.1/515))

C = 0.525

Equation 2: V = C * T * 0.027

for STRM 4003:

V = 0.525 * 515 * 0.027

V = 7.30 Mgal/inch

Equation 1: P = V * UC * 0.008337

for STRM 4003:

P = 7.30 * 4.59 * 0.008337
P = 0.28 lbs/inch

A.3 CONCLUSIONS

There are three primary changes to the methodology used in this evaluation compared to the 1999 evaluation. First, the data from the drainage area were limited to data collected from January 2001 to July 2003. This was done to reflect more current conditions from ongoing remediation along with associated uranium concentration reductions. Second, the four minor drainage areas along the Paddys Run corridor were added so that all areas, potentially under the influence of past FCP operations, are captured in the runoff estimate. Third, median concentrations were used rather than the 95 percent UCLs, because it is thought that median concentrations are more representative for estimating uranium concentrations when evaluating uranium loading on an annual basis. The 95 percent UCL concentration is considered to be overly conservative.

The use of the median is considered to be more representative because it is unaffected by any extreme observations in a set of data. Additionally, there are many variables that impact the actual sampled concentration at a given point of time. For instance, concentrations will be higher if samples are collected within the first several minutes of a discharge (first flush) compared to the concentration towards the end of a discharge. Since the FCP is evaluating a group of data to estimate a single annual loading, it is more representative to base this estimate on typical concentrations rather than extremes in concentrations. The median has the advantage of using all the data (no elimination of outliers), while providing a smoothing affect to those extreme data points.

Based on the three changes to the methodology discussed above, the summation of uranium pounds for each inch of rainfall (P) for each drainage basin area is 1.49 (refer to Table A-3). As identified, the loading value based on median results is thought to more likely represent the changing concentrations during the course of surface water discharge events. Therefore, the loading value of 1.49 pounds of uranium per inch of rainfall, based on median concentrations, will be used in future calculations when estimating the pounds of uranium entering the environment through uncontrolled runoff. It should be noted that regardless of the changes to the methodology used to calculate the loading term, loadings from STRM 4003 and 4004/4004A have decreased, while the loadings from the other basins (those used in previous calculations) have remained about the same. This is expected since most of the contamination sources in these two areas have been remediated in the last three years. Additionally, in an effort to maintain an accurate loading term, this evaluation process will be repeated in the future as remediation progresses and site conditions affecting the quantity and/or quality of uncontrolled runoff are observed.

TABLE A-1

TOTAL URANIUM RESULTS FOR SURFACE WATER LOCATIONS 4003, 4004, 4005, 4006, AND SWD-02

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4003	Uranium, Total	1/19/2001	12.226	-	µg/L	N
STRM 4003	Uranium, Total	5/18/2001	7.7	NV	µg/L	N
STRM 4003	Uranium, Total	7/9/2001	3.149	-	µg/L	N
STRM 4003	Uranium, Total	10/12/2001	3.8	NV	µg/L	N
STRM 4003	Uranium, Total	1/24/2002	4.1	NV	µg/L	N
STRM 4003	Uranium, Total	1/24/2002	4.4	NV	µg/L	N
STRM 4003	Uranium, Total	2/20/2002	10.152	-	µg/L	N
STRM 4003	Uranium, Total	4/13/2002	5.8	NV	µg/L	N
STRM 4003	Uranium, Total	9/27/2002	4.1	NV	µg/L	N
STRM 4003	Uranium, Total	10/19/2002	2.5	NV	µg/L	N
STRM 4003	Uranium, Total	1/1/2003	4.771	-	µg/L	N
STRM 4003	Uranium, Total	4/21/2003	3.3	NV	µg/L	N
STRM 4003	Uranium, Total	7/2/2003	5	NV	µg/L	N
STRM 4004	Uranium, Total	2/16/2001	46.3	-	µg/L	N
STRM 4004	Uranium, Total	6/6/2001	10.3	NV	µg/L	N
STRM 4004A	Uranium, Total	9/19/2001	8.604	-	µg/L	N
STRM 4004A	Uranium, Total	10/12/2001	12.2	NV	µg/L	N
STRM 4004A	Uranium, Total	2/20/2002	35.268	-	µg/L	N
STRM 4004A	Uranium, Total	3/16/2002	8.2	NV	µg/L	N
STRM 4004A	Uranium, Total	3/16/2002	8	NV	µg/L	N
STRM 4004A	Uranium, Total	4/13/2002	10.7	NV	µg/L	N
STRM 4004A	Uranium, Total	9/27/2002	1.9	NV	µg/L	N
STRM 4004A	Uranium, Total	10/25/2002	13.8	NV	µg/L	N
STRM 4004A	Uranium, Total	1/1/2003	8.207	-	µg/L	N
STRM 4004A	Uranium, Total	4/21/2003	32.1	NV	µg/L	N
STRM 4004A	Uranium, Total	7/9/2003	16.7	NV	µg/L	N
STRM 4005	Uranium, Total	1/19/2001	73.303	-	µg/L	N
STRM 4005	Uranium, Total	4/20/2001	29.207	-	µg/L	N
STRM 4005	Uranium, Total	7/9/2001	127.618	-	µg/L	N
STRM 4005	Uranium, Total	10/12/2001	57.3	NV	µg/L	N
STRM 4005	Uranium, Total	2/20/2002	36.202	-	µg/L	N
STRM 4005	Uranium, Total	2/26/2002	44.3	NV	µg/L	N
STRM 4005	Uranium, Total	2/26/2002	46.1	NV	µg/L	N
STRM 4005	Uranium, Total	4/13/2002	34	NV	µg/L	N
STRM 4005	Uranium, Total	7/10/2002	172.8	NV	µg/L	N
STRM 4005	Uranium, Total	10/5/2002	365.5	NV	µg/L	N
STRM 4005	Uranium, Total	1/1/2003	40.01	-	µg/L	N
STRM 4005	Uranium, Total	4/18/2003	48.4	NV	µg/L	N
STRM 4005	Uranium, Total	7/2/2003	137.1	NV	µg/L	N
STRM 4006	Uranium, Total	1/19/2001	45.669	-	µg/L	N
STRM 4006	Uranium, Total	5/13/2001	18.2	NV	µg/L	N
STRM 4006	Uranium, Total	7/9/2001	23.918	-	µg/L	N
STRM 4006	Uranium, Total	10/12/2001	8.5	NV	µg/L	N
STRM 4006	Uranium, Total	1/30/2002	45.1	NV	µg/L	N
STRM 4006	Uranium, Total	1/30/2002	40.5	NV	µg/L	N

TABLE A-1
(Contd)

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4006	Uranium, Total	2/20/2002	47.258	-	µg/L	N
STRM 4006	Uranium, Total	4/13/2002	16.5	NV	µg/L	N
STRM 4006	Uranium, Total	9/27/2002	3.2	NV	µg/L	N
STRM 4006	Uranium, Total	10/5/2002	45.7	NV	µg/L	N
STRM 4006	Uranium, Total	1/1/2003	21.204	-	µg/L	N
STRM 4006	Uranium, Total	4/18/2003	47	NV	µg/L	N
STRM 4006	Uranium, Total	7/2/2003	17.4	NV	µg/L	N
SWD-02	Uranium, Total	1/19/2001	37.171	J	µg/L	D
SWD-02	Uranium, Total	1/19/2001	43.87	J	µg/L	N
SWD-02	Uranium, Total	1/19/2001	39.852	J	µg/L	N
SWD-02	Uranium, Total	2/16/2001	19.812	-	µg/L	N
SWD-02	Uranium, Total	2/16/2001	19.232	-	µg/L	D
SWD-02	Uranium, Total	3/13/2001	34.294	-	µg/L	N
SWD-02	Uranium, Total	3/13/2001	34.261	-	µg/L	D
SWD-02	Uranium, Total	4/7/2001	12.256	-	µg/L	D
SWD-02	Uranium, Total	4/7/2001	12.285	-	µg/L	N
SWD-02	Uranium, Total	4/20/2001	15.916	J	µg/L	N
SWD-02	Uranium, Total	5/13/2001	15.6	NV	µg/L	D
SWD-02	Uranium, Total	5/13/2001	15.5	NV	µg/L	N
SWD-02	Uranium, Total	6/2/2001	12	NV	µg/L	D
SWD-02	Uranium, Total	6/2/2001	11.9	NV	µg/L	N
SWD-02	Uranium, Total	7/6/2001	8.58	J	µg/L	N
SWD-02	Uranium, Total	7/6/2001	9.175	-	µg/L	N
SWD-02	Uranium, Total	7/6/2001	9.27	-	µg/L	D
SWD-02	Uranium, Total	8/19/2001	9.5	NV	µg/L	N
SWD-02	Uranium, Total	8/19/2001	9.5	NV	µg/L	D
SWD-02	Uranium, Total	9/14/2001	4.9	J	µg/L	D
SWD-02	Uranium, Total	9/14/2001	4.985	J	µg/L	N
SWD-02	Uranium, Total	10/12/2001	7.9	NV	µg/L	D
SWD-02	Uranium, Total	10/12/2001	7.67	J	µg/L	N
SWD-02	Uranium, Total	10/12/2001	6.5	NV	µg/L	N
SWD-02	Uranium, Total	11/25/2001	10.3	NV	µg/L	N
SWD-02	Uranium, Total	11/25/2001	10	NV	µg/L	D
SWD-02	Uranium, Total	12/13/2001	16.2	NV	µg/L	D
SWD-02	Uranium, Total	12/13/2001	16.2	NV	µg/L	N
SWD-02	Uranium, Total	2/10/2002	18.1	J	µg/L	N
SWD-02	Uranium, Total	4/25/2002	13.5	NV	µg/L	N
SWD-02	Uranium, Total	8/19/2002	5.4	NV	µg/L	N
SWD-02	Uranium, Total	10/5/2002	24.5	NV	µg/L	N
SWD-02	Uranium, Total	10/5/2002	26.3	NV	µg/L	N
SWD-02	Uranium, Total	3/13/2003	7.9	-	µg/L	N
SWD-02	Uranium, Total	4/21/2003	23.4	NV	µg/L	N
SWD-02	Uranium, Total	7/2/2003	7.8	NV	µg/L	N

[a]If more than one sample is collected for a given location on the same day, then the sample with the maximum concentration is used for statistical analysis.

[b]If more than one sample per day per location was collected (N (normal) and D (duplicate)), then the highest concentration for the day was used for statistical analysis.

TABLE A-2

TOTAL URANIUM AND DRAINAGE BASIN ACREAGE (TOTAL, IMPERVIOUS AND PERVIOUS) DATA USED TO PERFORM POUNDS OF URANIUM PER INCH OF RAINFALL CALCULATIONS

Associated Surface Water Locations	Median of Total Uranium Concentrations (UC) (μg/L)	Total Drainage Basin Area (T) (acres)	Total Impervious Drainage Basin Area (TI) (acres)	Total Pervious Drainage Basin Area (TP) (acres)
STRM 4003	4.59	515	32.1	482.9
STRM 4004	11.45	18.0	0.8	17.2
STRM 4005	52.9	66.0	24.4	41.6
STRM 4006	22.6	214	8.9	205.1
WPC	25[a]	17	0	17
HRC	12.9[b]	18	0	18
SWU	12.9[b]	25	0	25
BRIDGE	12.9[b]	5	0	5

[a]Concentration based on both suspected soil contamination prior to Waste Pit Area Runoff Control Project (Removal Action 1) and similar runoff concentrations in the production area.
[b]Concentration based on SWD-02.

TABLE A-3

CALCULATED VARIABLES ASSOCIATED WITH EACH DRAINAGE BASIN SURFACE WATER LOCATION

Associated Surface Water Locations	Runoff Coefficient (C) (unitless)	Volume of Runoff per Inch of Rainfall (V) (Mgal/in)	Pounds of Uranium for Each Inch of Rainfall (P) (lbs/in)
STRM 4003	0.525	7.30	0.28
STRM 4004	0.518	0.25	0.02
STRM 4005	0.648	1.15	0.51
STRM 4006	0.517	2.99	0.56
WPC	0.5[a]	0.23	0.05
HRC	0.5[a]	0.24	0.03
SWU	0.4[a]	0.27	0.03
BRIDGE	0.5[a]	0.07	0.01
TOTAL			**1.49**

[a]Estimated values based on best professional judgement and EPA Office of Water Enforcement and Permits Guidance Manual/EPA Stormwater Guidance Manual.

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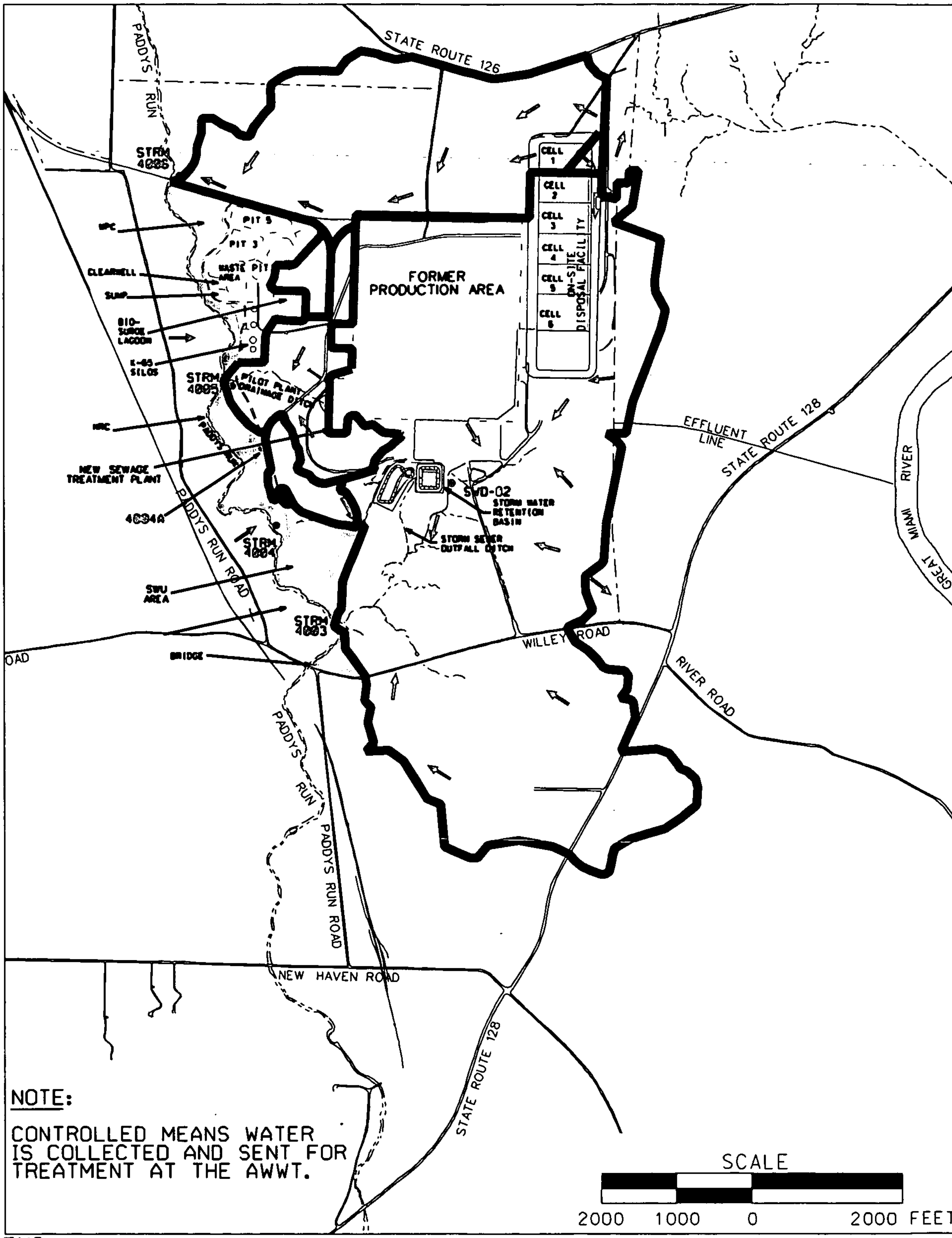

NOTE:

CONTROLLED MEANS WATER IS COLLECTED AND SENT FOR TREATMENT AT THE AWWT.

LEGEND:

FCP SITE BOUNDARY

DRAINAGE BASIN BOUNDARY

UNCONTROLLED RUNOFF FLOW DIRECTION

UNCONTROLLED RUNOFF SAMPLING LOCATIONS

PADDYS RUN CORRIDOR UNCONTROLLED RUNOFF

CONTROLLED AREA

WATER TREATED IF TOTAL URANIUM RESULT IS >30 μg/L

FINAL

FIGURE A-1. CONTROLLED SURFACE WATER AREAS AND UNCONTROLLED FLOW DIRECTIONS

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REFERENCES

U.S. Environmental Protection Agency, 1991, *Office of Water Enforcement and Permits Guidance Manual*, "U.S. Environmental Protection Agency Stormwater Guidance Manual," Section 5.3.1, Washington, D.C.